Pecipta'22

UNIVERSITY OF Southampton MALAYSIA

QUIZONA CHEMISTRY

A made-in-Malaysia Chemistry quiz app tailored for students learning Chemistry across the globe.

Contents

Executive Summary

ORIGINALITY

2 INTELLECTUAL PROPERTIES	2 intellectual properties awarded by MYIPO
4 INDUSTRIAL COLLABORATORS	STEM Johor, JPNJ, Majilis Guru Cemerlang, MPGSJB
5 SYLLABUS	O-Level, SAT, SMA, SPM, UEC
9 LANGUAGES	Chinese, English, French, Hindi, Indonesian, Malay, Mauritian Creole, Korean, Tamil
10,500 QUESTIONS	Contains over 10,500 questions from past year papers

STATUS & IMPACT

2 ENGAGEMENT WITH MINISTERS

6 INTERNATIONAL & NATIONAL AWARDS

5/5 ON APP STORE

11,000 USERS

102 COUNTRIES

3 PUBLICATIONS

1. Problem Statement

The recent unforeseen Covid-19 pandemic has affected almost every student across the globe, and it has highlighted several key issues with pre-pandemic education. Firstly, the change from face-to-face classroom learning to online hybrid learning meant that some students may struggled to learn at home by themselves. Secondly, the change in the mode of learning led to a sudden increase in the use of devices to study Chemistry from 78.1% in 2015 to 100% in 2021. This caused an increase in the difficulty to maintain students' interest in the subject, since they are now more interested in using said devices to play games. Thirdly, changes in the syllabus during the pandemic may be hard to implement. In Malaysia, as part of its Education Blueprint 2013-2025, there was a major change in the national curriculum moving from Kurikulum Bersepadu Sekolah Menengah (KBSM) to Kurikulum Standard Sekolah Menengah (KSSM).

Given the use of smartphones from 19.0 hours/week in 2015 increased to 49.0 hours/week in 2021, the sudden increase in the use of smartphones in the learning of Chemistry subjects inspired the idea to produce a single application to help improve learners' proficiency in chemistry learning to the maximum. The use of this innovative application helps both online and classroom learning because Quizona Chemistry does not require Internet data, hence the use of this application offline is also applicable. Learners can use it everywhere.

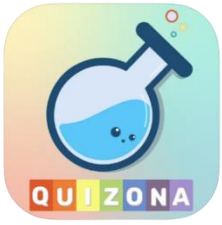


Figure 1. Quizona Chemistry.

The development of Quizona Chemistry is unique as it was based on the collaboration between educators and secondary school students (SMK Dato' Jaafar) in Johor Bahru, as well as with educators and graduates of private institution (University of Southampton Malaysia) during the Iskandar Puteri Movement Control Order 3.0 in Malaysia. This Innovation is a new application covering 9 languages and 5 global syllabuses in Chemistry subjects from 4 different countries (Malaysia, Indonesia, United Kingdom, United States)allowing it to have the edge at the international level. The questions in the bank of questions will be also be randomized on every attempt made by learners, making every try a genuine attempt at solving the questions. Furthermore, the app is completely free and encourages democratised & personalised learning of chemistry through the inclusion of gamification elements, increasing the motivation of students when studying the subject.

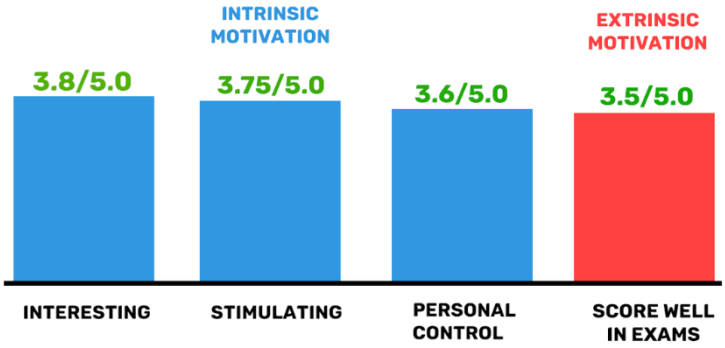


Figure 2. Students' intrinsic & extrinsic motivation after using Quizona Chemistry.

The construction of this application was successfully produced within two months which can have a global impact (Malaysia, Indonesia, Republic of Mauritius, United Kingdom, United States, Korea and others). Students all over the world especially candidates who take SPM KSSM can download this application for free and use it anywhere without data or internet. In addition, educators can also use it in classrooms or online, as groups or as individuals as deemed appropriate.

3. Originality of Innovation

This creative innovation is a new application covering 9 languages: Malay, English, Chinese, Tamil, Indonesian, French, Mauritian Creole, Hindi and Korean. In addition, the Quizona Chemistry App also covers 5 main syllabuses in Chemistry subjects namely: *Sijil Pelajaran Malaysia* SPM (New KSSM Format), *General Certificate of Education Ordinary Level* (O Level), *Scholastic Assessment Test* (SAT), Indonesian National Curriculum – *Ujian Nasional: Sekolah Menengah Atas* (SMA) and *Unified Examination Certificate* (UEC), making it is the 'largest chemistry app in the world', as said by the Ministry of Education. It also has over 10,500 questions, the equivalent of 42 books, easily accessible at the fingertips of our users.

Figure 3. Quizona Chemistry was featured at the Malaysia TORAY Science Foundation booth during the Kuala Lumpur Education Science Fair.

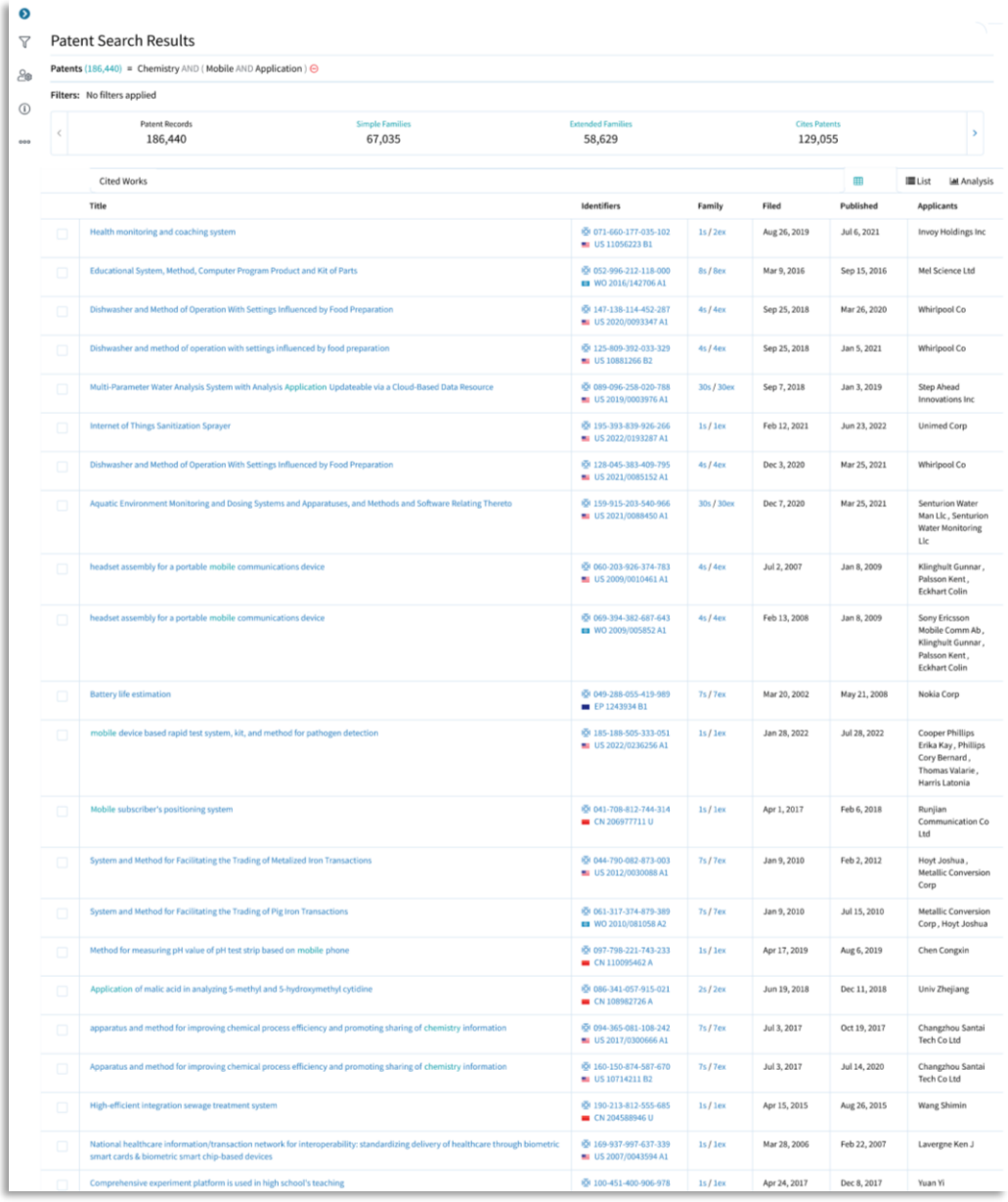
Recognition for the potential of the app quickly grew after it won multiple international and national awards. These includes the best innovation award from DSS 2022, awarded by the Malaysian Minister of Higher Education, YB Datuk Seri Dr. Noraini Binti Ahmad, the Science Education Award from TORAY Japan, a Gold Award from NICETECH 2021 and many more.

Figure 4. Quizona Chemistry received the Best Innovation Award at DSS 2022.

Figure 5. Quizona Chemistry has won multiple international & national awards.

Research was also done on Lens.org, Apple App Store, and Google Playstore to verify the originality of the Mobile Application before 2 intellectual properties were voluntarily filed for assets of the app.

Figure 6. Filed for 2 intellectual property, Application number: AR2022J02867 (left), LY2022J02865 (right).



Patent Search Results

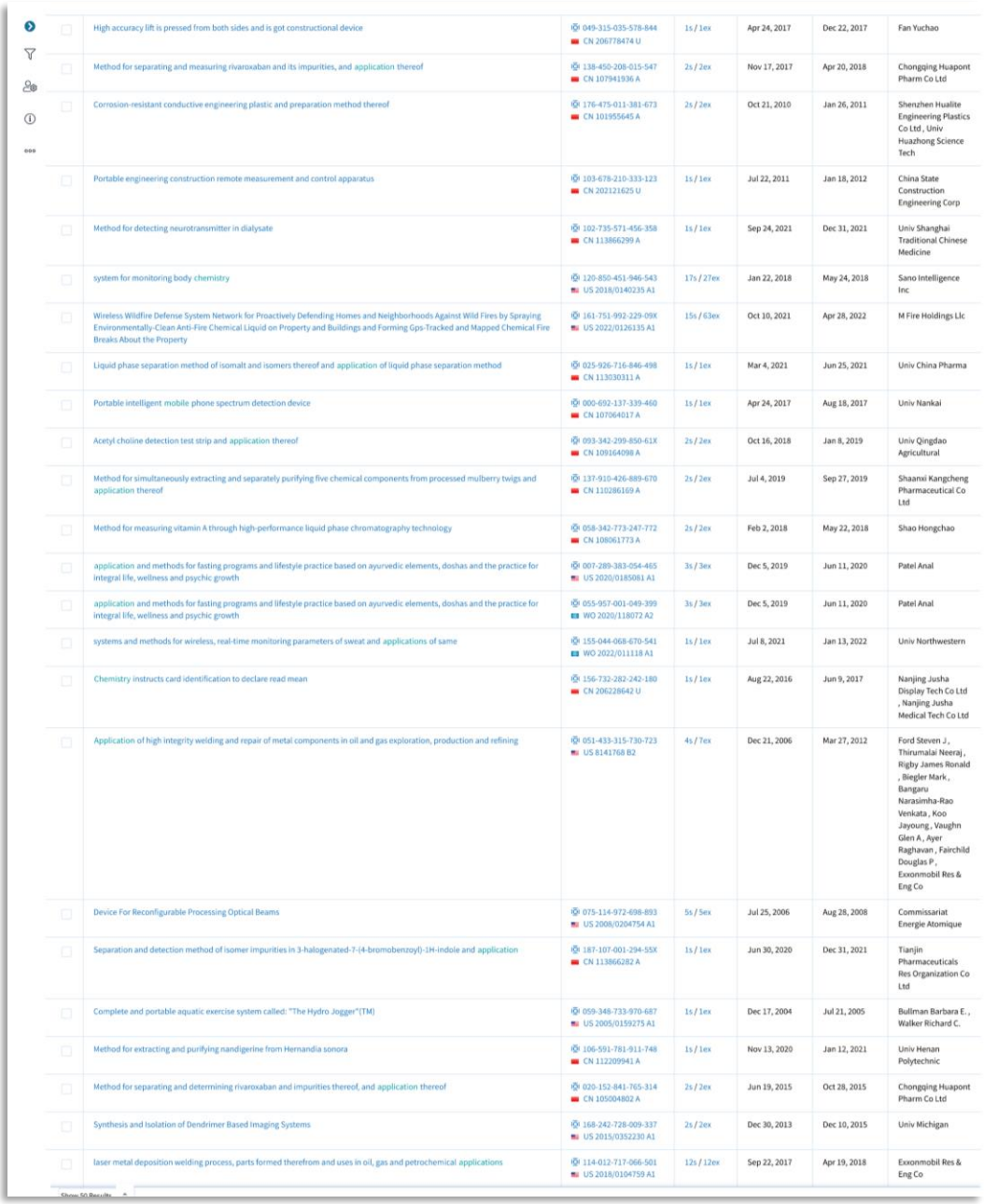
Patents (186,440) = Chemistry AND (Mobile AND Application)

Filters: No filters applied

Patent Records	Simple Families	Extended Families	Cites Patents
186,440	67,035	58,629	129,055

Cited Works | List | Analysis

Title	Identifiers	Family	Filed	Published	Applicants
Health monitoring and coaching system	071-660-177-035-102 US 11056223 B1	1s / 2ex	Aug 26, 2019	Jul 6, 2021	Invoy Holdings Inc
Educational System, Method, Computer Program Product and Kit of Parts	052-996-212-118-000 WO 2016/142706 A1	8s / 8ex	Mar 9, 2016	Sep 15, 2016	Mel Science Ltd
Dishwasher and Method of Operation With Settings Influenced by Food Preparation	147-138-114-452-287 US 2020/0093347 A1	4s / 4ex	Sep 25, 2018	Mar 26, 2020	Whirlpool Co
Dishwasher and method of operation with settings influenced by food preparation	125-809-392-033-329 US 10881266 B2	4s / 4ex	Sep 25, 2018	Jan 5, 2021	Whirlpool Co
Multi-Parameter Water Analysis System with Analysis Application Updateable via a Cloud-Based Data Resource	089-096-258-020-788 US 2019/0003976 A1	30s / 30ex	Sep 7, 2018	Jan 3, 2019	Step Ahead Innovations Inc
Internet of Things Sanitization Sprayer	195-393-839-926-266 US 2022/0193287 A1	1s / 1ex	Feb 12, 2021	Jun 23, 2022	Unimed Corp
Dishwasher and Method of Operation With Settings Influenced by Food Preparation	128-045-383-409-795 US 2021/0085152 A1	4s / 4ex	Dec 3, 2020	Mar 25, 2021	Whirlpool Co
Aquatic Environment Monitoring and Dosing Systems and Apparatuses, and Methods and Software Relating Thereto	159-915-203-540-966 US 2021/0088450 A1	30s / 30ex	Dec 7, 2020	Mar 25, 2021	Senturion Water Man Llc , Senturion Water Monitoring Llc
headset assembly for a portable mobile communications device	060-203-926-374-783 US 2009/0010461 A1	4s / 4ex	Jul 2, 2007	Jan 8, 2009	Klinghult Gunnar , Palsson Kent , Eckhart Colin
headset assembly for a portable mobile communications device	069-394-382-687-643 WO 2009/005852 A1	4s / 4ex	Feb 13, 2008	Jan 8, 2009	Sony Ericsson Mobile Comm Ab , Klinghult Gunnar , Palsson Kent , Eckhart Colin
Battery life estimation	049-288-055-419-989 EP 1243934 B1	7s / 7ex	Mar 20, 2002	May 21, 2008	Nokia Corp
mobile device based rapid test system, kit, and method for pathogen detection	185-188-505-333-051 US 2022/0236256 A1	1s / 1ex	Jan 28, 2022	Jul 28, 2022	Cooper Phillips Erika Kay , Phillips Cory Bernard , Thomas Valarie , Harris Latonia
Mobile subscriber's positioning system	041-708-812-744-314 CN 206977711 U	1s / 1ex	Apr 1, 2017	Feb 6, 2018	Runjian Communication Co Ltd
System and Method for Facilitating the Trading of Metalized Iron Transactions	044-790-082-873-003 US 2012/0030088 A1	7s / 7ex	Jan 9, 2010	Feb 2, 2012	Hoyt Joshua , Metallic Conversion Corp
System and Method for Facilitating the Trading of Pig Iron Transactions	061-317-374-879-389 WO 2010/081058 A2	7s / 7ex	Jan 9, 2010	Jul 15, 2010	Metallic Conversion Corp , Hoyt Joshua
Method for measuring pH value of pH test strip based on mobile phone	097-798-221-743-233 CN 110095462 A	1s / 1ex	Apr 17, 2019	Aug 6, 2019	Chen Congxin
Application of malic acid in analyzing 5-methyl and 5-hydroxymethyl cytidine	086-341-057-915-021 CN 108982726 A	2s / 2ex	Jun 19, 2018	Dec 11, 2018	Univ Zhejiang
apparatus and method for improving chemical process efficiency and promoting sharing of chemistry information	094-365-081-108-242 US 2017/0300666 A1	7s / 7ex	Jul 3, 2017	Oct 19, 2017	Changzhou Santai Tech Co Ltd
Apparatus and method for improving chemical process efficiency and promoting sharing of chemistry information	160-150-874-587-670 US 10714211 B2	7s / 7ex	Jul 3, 2017	Jul 14, 2020	Changzhou Santai Tech Co Ltd
High-efficient integration sewage treatment system	190-213-812-555-685 CN 204588946 U	1s / 1ex	Apr 15, 2015	Aug 26, 2015	Wang Shimin
National healthcare information/transaction network for interoperability: standardizing delivery of healthcare through biometric smart cards & biometric smart chip-based devices	169-937-997-637-339 US 2007/0043594 A1	1s / 1ex	Mar 28, 2006	Feb 22, 2007	Lavergne Ken J
Comprehensive experiment platform is used in high school's teaching	100-451-400-906-978	1s / 1ex	Apr 24, 2017	Dec 8, 2017	Yuan Yi



High accuracy lift is pressed from both sides and is got constructional device	049-315-035-578-844 CN 206778474 U	1s / 1ex	Apr 24, 2017	Dec 22, 2017	Fan Yuchao
Method for separating and measuring rivaroxaban and its impurities, and application thereof	138-450-208-015-547 CN 107941936 A	2s / 2ex	Nov 17, 2017	Apr 20, 2018	Chongqing Huapont Pharm Co Ltd
Corrosion-resistant conductive engineering plastic and preparation method thereof	176-475-011-381-673 CN 101955645 A	2s / 2ex	Oct 21, 2010	Jan 26, 2011	Shenzhen Hualite Engineering Plastics Co Ltd , Univ Huazhong Science Tech
Portable engineering construction remote measurement and control apparatus	103-678-210-333-123 CN 202121625 U	1s / 1ex	Jul 22, 2011	Jan 18, 2012	China State Construction Engineering Corp
Method for detecting neurotransmitter in dialysate	102-735-571-456-358 CN 113866299 A	1s / 1ex	Sep 24, 2021	Dec 31, 2021	Univ Shanghai Traditional Chinese Medicine
system for monitoring body chemistry	120-850-451-946-543 US 2018/0140235 A1	17s / 27ex	Jan 22, 2018	May 24, 2018	Sano Intelligence Inc
Wireless Wildfire Defense System Network for Proactively Defending Homes and Neighborhoods Against Wild Fires by Spraying Environmentally-Clean Anti-Fire Chemical Liquid on Property and Buildings and Forming Gps-Tracked and Mapped Chemical Fire Breaks About the Property	161-751-992-229-09X US 2022/0126135 A1	15s / 63ex	Oct 10, 2021	Apr 28, 2022	M Fire Holdings Llc
Liquid phase separation method of isomalt and isomers thereof and application of liquid phase separation method	025-926-716-846-498 CN 113030311 A	1s / 1ex	Mar 4, 2021	Jun 25, 2021	Univ China Pharma
Portable intelligent mobile phone spectrum detection device	000-692-137-339-460 CN 107064017 A	1s / 1ex	Apr 24, 2017	Aug 18, 2017	Univ Nankai
Acetyl choline detection test strip and application thereof	093-342-299-850-61X CN 109164098 A	2s / 2ex	Oct 16, 2018	Jan 8, 2019	Univ Qingdao Agricultural
Method for simultaneously extracting and separately purifying five chemical components from processed mulberry twigs and application thereof	137-910-426-889-670 CN 110286169 A	2s / 2ex	Jul 4, 2019	Sep 27, 2019	Shaanxi Kangcheng Pharmaceutical Co Ltd
Method for measuring vitamin A through high-performance liquid phase chromatography technology	058-342-773-247-772 CN 108061773 A	2s / 2ex	Feb 2, 2018	May 22, 2018	Shao Hongchao
application and methods for fasting programs and lifestyle practice based on ayurvedic elements, doshas and the practice for integral life, wellness and psychic growth	007-289-383-054-465 US 2020/0185081 A1	3s / 3ex	Dec 5, 2019	Jun 11, 2020	Patel Anal
application and methods for fasting programs and lifestyle practice based on ayurvedic elements, doshas and the practice for integral life, wellness and psychic growth	055-957-001-049-399 WO 2020/118072 A2	3s / 3ex	Dec 5, 2019	Jun 11, 2020	Patel Anal
systems and methods for wireless, real-time monitoring parameters of sweat and applications of same	155-044-068-670-541 WO 2022/011118 A1	1s / 1ex	Jul 8, 2021	Jan 13, 2022	Univ Northwestern
Chemistry instructs card identification to declare read mean	156-732-282-242-180 CN 206228642 U	1s / 1ex	Aug 22, 2016	Jun 9, 2017	Nanjing Jusha Display Tech Co Ltd , Nanjing Jusha Medical Tech Co Ltd
Application of high integrity welding and repair of metal components in oil and gas exploration, production and refining	051-433-315-730-723 US 8141768 B2	4s / 7ex	Dec 21, 2006	Mar 27, 2012	Ford Steven J , Thirumalai Neeraj , Rigby James Ronald , Biegler Mark , Bangaru Narasimha-Rao Venkata , Koo Jayoung , Vaughn Glen A , Ayer Raghavan , Fairchild Douglas P , Exxonmobil Res & Eng Co
Device For Reconfigurable Processing Optical Beams	075-114-972-698-893 US 2008/0204754 A1	5s / 5ex	Jul 25, 2006	Aug 28, 2008	Commissariat Energie Atomique
Separation and detection method of isomer impurities in 3-halogenated-7-(4-bromobenzoyl)-1H-indole and application	187-107-001-294-55X CN 113866282 A	1s / 1ex	Jun 30, 2020	Dec 31, 2021	Tianjin Pharmaceuticals Res Organization Co Ltd
Complete and portable aquatic exercise system called: "The Hydro Jogger"(TM)	059-348-733-970-687 US 2005/0159275 A1	1s / 1ex	Dec 17, 2004	Jul 21, 2005	Bullman Barbara E , Walker Richard C.
Method for extracting and purifying nandigerine from Hernandia sonora	106-591-781-911-748 CN 112209941 A	1s / 1ex	Nov 13, 2020	Jan 12, 2021	Univ Henan Polytechnic
Method for separating and determining rivaroxaban and impurities thereof, and application thereof	020-152-841-765-314 CN 105004802 A	2s / 2ex	Jun 19, 2015	Oct 28, 2015	Chongqing Huapont Pharm Co Ltd
Synthesis and Isolation of Dendrimer Based Imaging Systems	168-242-728-009-337 US 2015/0352230 A1	2s / 2ex	Dec 30, 2013	Dec 10, 2015	Univ Michigan
laser metal deposition welding process, parts formed therefrom and uses in oil, gas and petrochemical applications	114-012-717-066-501 US 2018/0104759 A1	12s / 12ex	Sep 22, 2017	Apr 19, 2018	Exxonmobil Res & Eng Co

Figure 7. Top 50 results for the search "Chemistry Mobile Application" on lens.org.

4. Applicability of Innovation

Prior to development, surveys were conducted on Form 4 (Year 10), Form 5 (Year 11) and pre-university students under the Malaysian education system. The results of the surveys showed that that on average, 96.3% of students have access to smart devices, be it the smart phone or tablet. Furthermore, among smart devices, students overwhelmingly owned smart phones at an adoption rate of 93.8%.

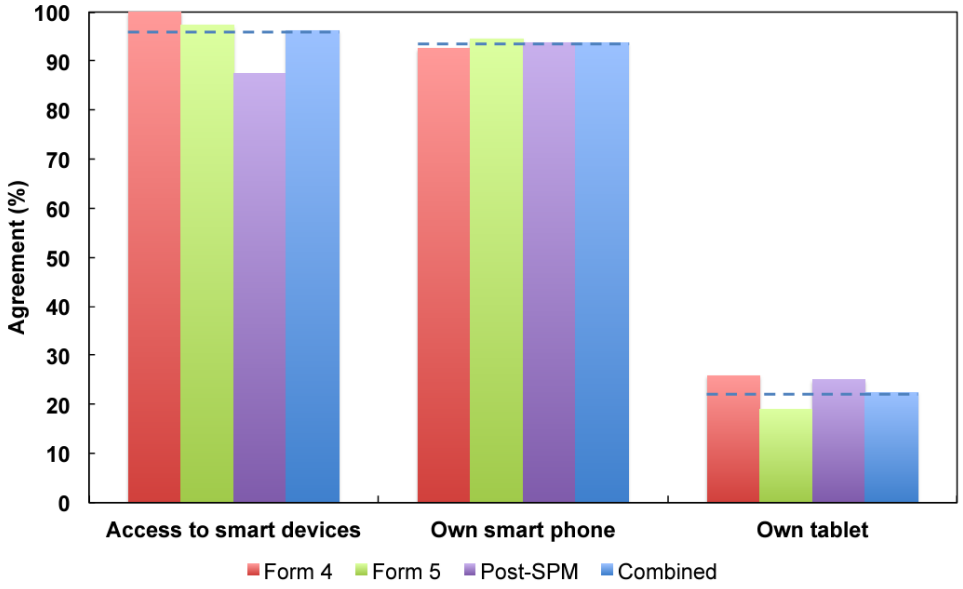


Figure 8. Student's access to smart devices.

Additionally, 73.0% of Form 5 students indicated that they are interested to install an SPM-syllabus chemistry app into their smart devices. However, only 13.75% of students on average are willing to pay for such an app. Hence, there is a substantial demand for a free SPM syllabus chemistry app.

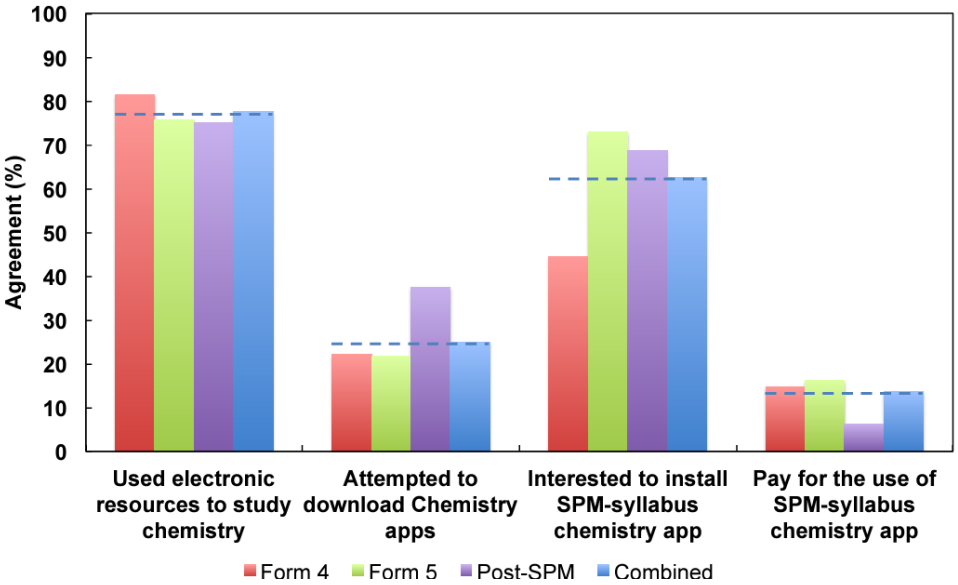


Figure 9. Students' perceptions on using electronic resources to study chemistry.

In addition, Quizona Chemistry was built to solve the 3 problems mentioned under section 1 (Problem Statement) in 3 main ways.

Firstly, with the implementation of the new national curriculum, Quizona Chemistry became the first app to include the new syllabus under the KSSM for the Ministry of Education in Malaysia.

Secondly, this innovation is completely free to use, thus encouraging democratised learning among students at an international level.

Thirdly, it comes with a new education technique called gamification. Gamification is the technique used to make the process of learning more engaging by adding in elements of games, hence enabling students to have fun while learning chemistry.

5. Status of Innovation

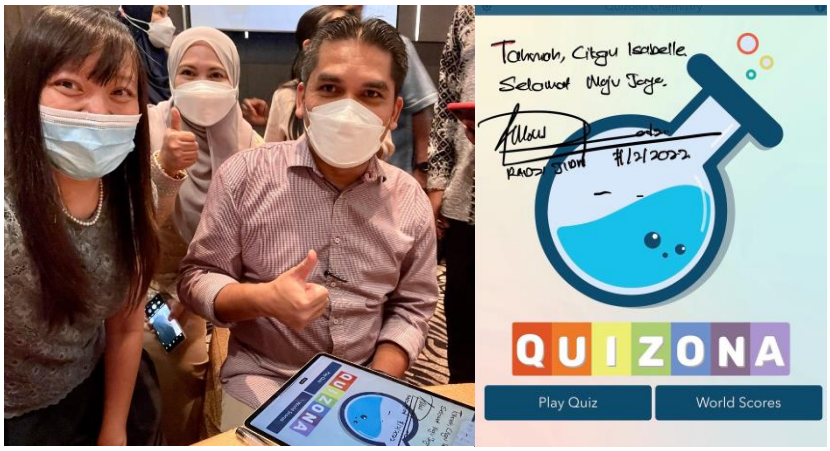


Figure 10. Minister of Education, Datuk Dr Mohd Radzi Md Jidin, praising the app after using it.

Quizona Chemistry is fully commercialised putting it at a technology readiness level of 9. It is a fully functional and fully commercialised mobile application available to download for free, from the App Store. It has also been used by the Malaysian Minster of Education, Datuk Dr Mohd Radzi Md Jidin.

Durability was another one of the priorities the development team had to consider. Many closed alpha & beta testing were performed to ensure the reliability and compatibility of the app, giving users a hassle-free experience when using the app.

To ensure relavence to the Science, Technology, Engineering and Mathematics (STEM) industry, the app collaborated with 4 industrial collaborators.

Figure 11. Our collaborators.

6. Commercializability

The nature of this innovation also gives it a major advantage in terms of commercializability as it allows the app to be sent to markets worldwide easily through the Apple App Store.

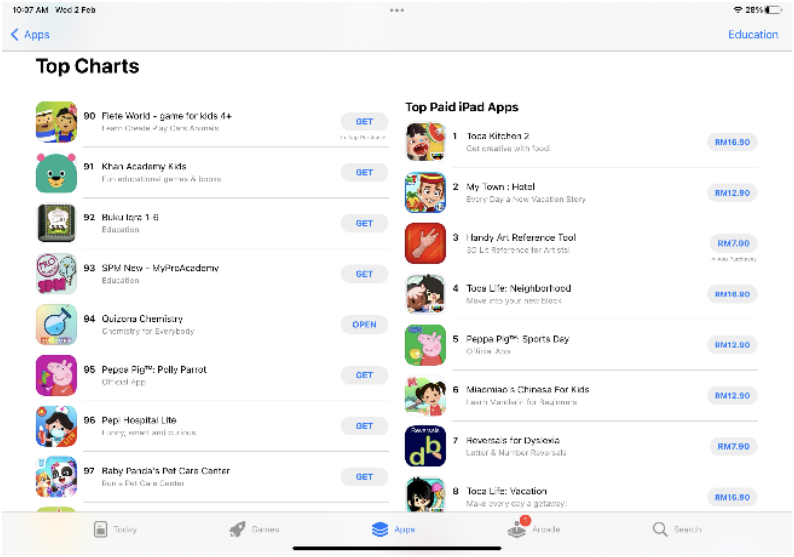


Figure 12. Quizona Chemistry achieved top 100 in the education category in the App Store.

Research has been conducted on the usability of the app in Malaysia, and it was found an estimate of 400,000 new users could be expected annually. But, Quizona Chemistry also have markets abroad and has the potential to be the go-to app among students worldwide. At the time of writing, the app has over 11,000 users, consisting of both students and teachers, from across 102 different countries, showing the great demand the app currently possess.

Figure 13. The global outreach of Quizona Chemistry.

In addition, Quizona Chemistry is the only education app in Malaysia to be recognised by a state education department, Jabatan Pendidikan Negeri Johor (JPNJ), whom officially launched the app on 22 November 2021 and has plans for the app to be used in classrooms by more than 400,000 secondary school students taking chemistry.

Figure 14. The official launch of Quizona Chemistry by JPNJ in 2021.

Quizona Chemistry is freely available to download, because the development team believes in the educational value it brings to students globally. Hence, despite not generating any revenue, it can be said that the app is high in both demand and educational value. Over the 6 years of continuous update and development, the development process for such a technology has been streamlined, allowing the technology to be transferred over to other subjects beyond just chemistry as well as to other educational levels beside secondary education.

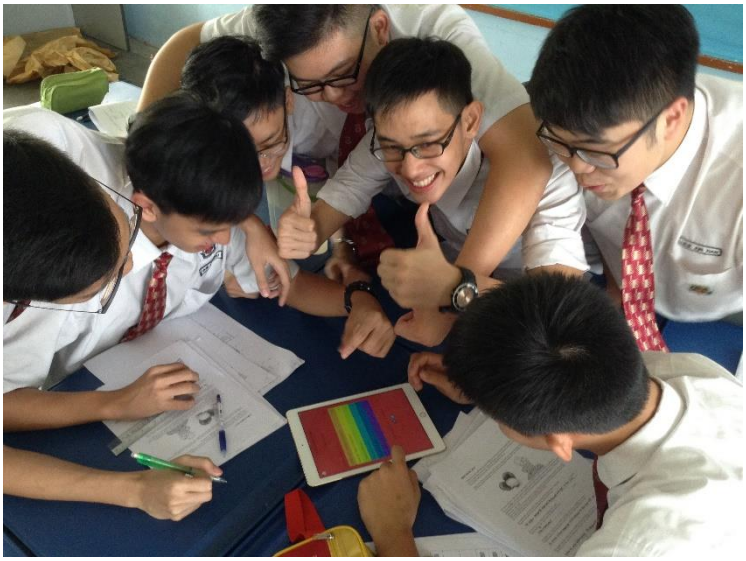


Figure 15. Deployment of Quizona Chemistry in schools.

Conclusion

In conclusion, Quizona Chemistry is 100% proven for use at the education level. Supporting research has been conducted to tailor the app to the needs of over 11,000 users from across 102 countries who are currently using the app. This app is also recognised for official use in schools in Johor, Malaysia and has won multiple international and national awards, thus, further showing the potential and credibility of this app. The vision of the development team is to make it such at student could choose not to pay to learn, but instead play to learn.